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if we could find them, supposed to be absolute, we now look upon allied species as having descended from a common ancient stock, of which intermediate forms have died out, and therefore do not expect that allied forms, on the whole distinct and definable, should be completely unconnected by certain links or vestiges of links. Moreover, it used to be thought that hybrids were necessarily sterile, but it is now known that some hybrids are fertile, and that their offspring, fertilized by either parent, are generally fertile; that in this way intermediate forms between two species may originate; and it is clear that the two species ought not to be reduced to one on account of such intermediate forms. Dr. Gray referred to *Rosa*, *Rubus* and *Hieracium*, in the Old World, as genera in which no two botanists who had studied them could agree as to what were species; one school reducing them to very few, which they can define only by disregarding certain intermediate forms; the other multiplying them by hundreds, and characterizing them by distinctions which might serve for the specimens in hand, but which failed with every new collection. This necessitated either the formation of a still finer-drawn set of species, or the falling back to the broader Linnæan conception of a species. The latter alternative had been generally followed in this country, and Dr. Gray hoped that the coming American botanists would incline to this view in the treatment of our critical genera.

Relation of Medullary Rays to the Strength of Timber.—Dr. ROTHROCK called attention to some experiments made by Mr. Frank Day, in the laboratory of the University of Penna., on the relation of the medullary ray to the strength of timber. Mr. Day had found that it required just about twice as much force (say 1130 pounds) to pull apart a square inch of live oak, if the force ran parallel to these rays as if the force were applied at right-angles to them.

What is true of the live oak was also largely true of other timbers. The buttonwood (*Platanus occidentalis*) was remarkable for the development of its medullary rays, and also for the difficulty in splitting that wood at right-angles to them.

Mr. Day's experiments also proved that there existed great differences in the quality of the material of the woody fibre; for in timber where the relative proportion of wood and ducts could well be compared, and where the fibres were of equal size throughout, differences in strength were to be found.

Botanical Notes. Double Flowers in Gelsemium nitidum; Euonymus Japonicus; Development of Fruit of Opuntia; Helianthus tuberosus; Carya glabra.—Mr. MEEHAN exhibited two specimens of double flowers of *Gelsemium nitidum*, one found wild in Georgia, the other in Alabama. One was straw-colored, the other deep yellow. He remarked that many double flowers in

gardens, credited to the florists' skill, were wildlings which had been taken into cultivation.

Mr. Meehan also remarked that *Euonymus radicans*, under culture from Japan, is believed by some modern botanists to be but a variety of *E. Japonicus*. He exhibited branches of the latter which had been produced by the former. They were not varieties, but simply frutescent and radicans forms of each other.

The speaker exhibited specimens of *Opuntia frutescens*, var. *longispina*, in which fruit had formed, though no flowers had appeared, the scarcely developed sepals and petals having been thrown off the apex in infancy. A regular gradation from perfect branches to these fruits was exhibited, some of those most closely related to perfectly formed fruit having a tendency to the red coloring which marked the fruits. Occasion was taken to emphasize the morphological doctrine, that fruits like apples and pears are but arrested branches.

In continuation, Mr. Meehan reintroduced specimens exhibited at a former meeting, showing that the roots of a supposed Jerusalem artichoke, wild near Philadelphia, and supposed to have been in some past time an escape from gardens, had characteristics somewhat different from the form now under culture in the vicinity, and inquired whether this might be what has been hitherto known as *Helianthus doronocoides*, which Dr. Gray had demonstrated some years ago in Silliman's Journal, to be the parent of *H. tuberosus*. If so, it might prove that this species was indigenous to Eastern Pennsylvania.

Dr. Asa Gray did not think the species was indigenous here. He rather suspected that the form now wild had once been the cultivated one, and that the ones now in use had been introduced since. He remarked that he had been working among the roots of different species of the genus, during the past autumn, some of which he found had merely fleshy roots, like those of *Dahlia*, making no runners; others had runners developed into true tubers.

Mr. Meehan also exhibited some nuts of *Carya glabra* Torr. (*C. porcina* Nutt.) which had been brought in by one of his seed collectors from a tree in the woods in the vicinity of Philadelphia. They had two or sometimes three nuts in a single exocarp, as in the manner of *Castanea vesca*, the common chestnut. The collector was under the impression that all the nuts borne by the tree were of a similar character.

Dr. ASA GRAY remarked that this occurrence of two or three nuts of *Carya* within the same husk, either separate or partly coherent, was of much morphological significance. Specimens like these had been sent to him several years ago, said to have been collected in Montgomery Co., Penna., with the remark that the tree bore a good many such abnormal fruits; Dr. Gray believed that the conclusion to which they inevitably pointed had

not yet been published. It was, however, communicated to Dr. Engelmann, along with a portion of his specimens, at least five years ago. The conclusion drawn was the following: The husk, or so-called exocarp, of *Carya*, is an *involucre*, usually containing a single female flower, and connate with its ovary; its true morphology is revealed when, as in this case, it contains two or three flowers. The stone or shell of the nut is the whole pericarp in *Carya* as much as in *Corylus*. In the former genus it becomes free from the four-valved involucre at maturity; in *Juglans* the congenital union is more permanent, forming a drupaceous accessory fruit, of which the fleshy part is involucre, the bony part is pericarp. This view directly homologizes the *Juglandaceæ* with the *Cupuliferæ*.

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